To remain dynamic and viable, academic institutions preparing the future workforce need to convert to a more accessible and convenient pathway for students. The need for responsiveness is especially true when considering strategies to prepare an allied health workforce in areas of shortages and to meet the needs of the underserved. A blended or hybrid learning model that strategically uses web-based and face-to-face teaching/learning methods is an innovative and strategic way that promotes learner-centered higher education and facilitates a higher learning experience. A model and emerging best practices for implementation are presented from our experience at the Center for Allied Health Programs (CAHP) at the University of Minnesota.


Online and Blended (or Hybrid) Learning: Definitions

The literature can be confusing when defining online and blended (or hybrid) learning, although the simplest definition might be: “Blended’ learning involves synchronous (real time) or asynchronous (anytime) learning with more than 20% face-to-face time.”1 (In this article, we will not distinguish between the two terms, blended and hybrid learning.) Blended learning, correctly developed, can optimize the learning experience by focusing on what is important.

Blended learning may be the preferred format for higher education in the near and distant future. According to a Chronicle Research Services Executive Summary, the college of 2020 will convert from a traditional full-time residential model of higher education to one of convenience for students.4 The college of the future will offer multiple technology-enhanced options for completing a degree with flexible points of entry, use of portable computing devices, and online access to professors, lectures, study groups, and submission of work. Admission demographics will change dramatically from traditional full-time students ages 18 to 25 who attend classes primarily on campus to 60% of classes being taken online, many by learners who are situated in the workforce and are taking classes part-time. This trend for increasing educational access by increasing online and blended learning supports the growing societal need for the allied health workforce. Increased access provides individual learners pathways toward career advancement in allied health and entry into a pipeline to educate the next educators. Blended learning combines the best of both worlds of online and classroom instruction through curricular design that selects the best teaching strategy to accomplish the intended student learning outcomes. For example, faculty can deliver basic knowledge through online lectures while utilizing active questioning techniques for engagement. To become competent, students must learn and demonstrate critical clinical competencies, such as ther-
A New Model: University of Minnesota Center for Allied Health Programs

At the start of this decade, the University of Minnesota faced significant challenges in educating allied health professionals, an era characterized by rising demand for workers and faculty and decreasing public investment in higher education. The University developed a transformative vision to address Minnesota’s workforce needs in allied health professions through the development of a Center for Allied Health Programs (CAHP). The initial programs that comprise the Center include Clinical Laboratory Science (Bachelor of Science degree) and Occupational Therapy (Master of Occupational Therapy degree). The Center was designed to provide a learner-centered, financially sustainable model for the education and training of allied health professionals who could be deployed throughout the state to meet critical workforce shortages. This model uses an integrated “blended” model of education strategically combining distance learning, classroom experiences, and experiential education. The CAHP model incorporates on-line learning technologies, classroom and laboratory teaching, and clinical skills assessment, all of which are supported by technology platforms—such as simulations, videoconferencing, or teleconferencing—to extend learning to students no matter where they are or when they can access learning.

The critical shortage of allied health professionals throughout Minnesota increased the urgency to develop distance learning solutions. The shortage of clinical laboratory science professionals was particularly critical in southern Minnesota due to the expansion of reference laboratory testing by the Mayo Clinic, one of the ten largest healthcare systems in the country. The recent establishment of a new University of Minnesota campus in Rochester provided the opportunity and space to expand the existing programs in clinical laboratory sciences and occupational therapy to Southern Minnesota. The addition of that coordinate campus site allowed the faculty the ability to develop, pilot, and test emerging technologies in distance learning and filled the need for additional laboratory and experiential learning opportunities.

In 2006, mandated by the VP of the Health Sciences, external reviews by national leaders in each discipline for both the Clinical Laboratory Science and Occupational Therapy curricula were conducted. The site visits and reviews confirmed that the curriculum of each program would best serve practice needs by first updating curricular design and then transforming the pedagogy—the teaching/learning methods used to deliver the curriculum. Therefore, to respond to external critiques, faculty needed to collaboratively create curriculum and basic design of courses, then acquire new teaching and learning concepts and skills required to support 21st century students. To do so, the Center for Allied Health Programs faculty leveraged the University’s comprehensive, enterprise-wide academic technology solutions by piloting and testing various educational delivery methods. The implementation of blended teaching/learning methods in our academic programs benefited from the essential support provided by the Academic Health Center Office of Education and the University’s Office of the Vice Provost for Distributed Education and Instructional Technology. Access to course management system such as WebVista/Blackboard and Moodle, real-time Web-conferencing and lecture capture software, and online evaluation and survey software that are centrally provided and administered have been key to the success of our allied health programs. All students use the University’s customized My U portal providing them with easy, secure access to a comprehensive collection of University resources and virtual collaboration sites. The University Libraries have also served to provide indispensable resources including e-reserve management, investment in online books and resources, and consultation on copyright and use of online subscription-based materials.

The Center has piloted and tested the following solutions:

- Outcomes-based curriculum design and development
- Support of an instructional design team to work with faculty to develop new, blended coursework
- Collaboration with the University’s central Office of Information Technology to provide faculty development workshops on technology-enhanced learning
- Engagement of the Office of the Vice-Provost for Distributed Education and Instructional Technology to allow the Center to serve as a partner and alpha-site for testing and using the University’s integrated “learning platform” technologies.

A number of lessons and best practices have emerged from these experiences and from the Center’s quality improvement processes in which students and faculty have been engaged.

Centralization of Related Blended Programs Provides Efficiencies for Administration

As the two programs were centralized under the Center administration, work flow, faculty development, student services, and technical support have also begun to be shared between programs. As a result, CAHP has been able to efficiently provide shared services such as Workforce Investment Act (WIA) certification, consultation for a design of virtual student services, and Quality Matters™ certification training (a national quality assurance process for development and teaching of online and blended courses), to faculty across the Center.

Blended Learning Is an Effective Model for Student Learning

As a result of 4 years’ experience with blended learning, CAHP faculty now recognize benefits derived from carefully
designed online activities, and they can flexibly target and use face-to-face time to ensure achievement of intended student learning outcomes. Use of classroom time is reserved for applying concepts and experiences that merit an active, face-to-face interaction between students (on both campuses through teleconferencing) and instructors. A recent meta-analysis of rigorous studies commissioned by the United States Department of Education cites evidence to support that blended learning is more effective than either face-to-face or online learning alone. Further, when comparing online and face-to-face instruction, online has proven at least as effective and perhaps more advantageous in improving student achievement and potentially expanding the amount of time (and quality time) students spend learning. Effective allied health education will always remain grounded in experiential learning, and the challenge will remain as to how much is sufficient and in which ways technology-based simulation can provide outcomes equivalent to real-time, face-to-face experience.

Changing Culture Through Faculty-Instructional Design Team Interaction

The classic instructional design process has been an effective method of developing online and blended courseware in the Center. CAHP faculty have partnered with each other as colleagues and with an instructional design team to redesign the curriculum, how they teach, and ultimately how students learn. The ADDIE instructional design process, used for course development, consists of five phases:

1. Analysis
2. Design
3. Development
4. Implementation, and
5. Evaluation.

Once learned and experienced, the process has been adopted by faculty and has provided an iterative structure for defining and developing successful blended, outcome-based learning. According to Peterson, using the ADDIE model throughout course development places the emphasis on the learner rather than on the instructor. Analysis of learners is an integral aspect of developing a course and provides a framework in which those involved in course development can engage in problem solving.

In using new approaches, CAHP faculty have come to understand and accept their new role as 'subject matter expert,' while working with instructional design experts who are well versed in creating effective hybrid models. Over time, faculty have developed new collaboration skills as team members, though it means learning to share 'control' of content and process decisions and to trust in the other instructional design team members. The goal for this collaboration has been to decrease dependence on instructional design expertise over time while developing consistent structures to support faculty. Such consensus and consistent instructional design strategies for the curriculum and courses developed have included: common templates for course development; case-based learning; integration of simulated or real practice throughout the curriculum; and an emphasis on competency-based outcomes. After designing the curriculum framework together, instructional designers have been assigned to work with specific faculty to develop each course, using consensus strategies. Faculty serve in the role of 'content experts,' while the instructional designer provides expertise in designing learning strategies and activities for that content. In addition, the instructional designers have developed train-the-trainer sessions and accompanying faculty development education materials to teach faculty how to conduct and assess students' professional competencies during their laboratory and clinical experiences.

Instructional designers and faculty have implemented the following process to develop each course:

- Conduct research and gather resources for each course;
- Develop a design outline that outlines the content, sequence, learning outcomes, balance of online and face-to-face learning, media flow, and student learning assessment for each course;
- Obtain feedback from faculty content experts to revise and finalize the design;
- Develop screen-by-screen scripts for online courses;
- Collaborate with Web developers, graphic designers, video developers to develop online courses;
- Obtain feedback from content experts on the final online and faculty materials once they have been produced;
- Deliver all courses, and provide frequent student feedback mechanisms, including course evaluations, student focus groups, and online discussion boards;
- Respond to student feedback by modifying the courses, as appropriate, and notifying subsequent students of those changes.

Designing Clearly and Logically Integrated Curricula

Faculty communication and collaboration is essential when designing a blended curriculum. The creation of silos within a program supports neither learning for students nor effective teaching on behalf of faculty. "You teach hematology, and I teach urinalysis, and we don't need to know what's in each other's course" represents a serious fault within any curriculum. 'Didactic faculty' must plan teaching, learning, and assessment activities with their faculty colleagues who teach the laboratory segments of the same courses. Furthermore, curricula should be mapped so that students learn from the outset how the integration of each of the sub-disciplines—for example, hematology and chemistry—interplay within the curriculum and in the lives of their future patients. Students have served as an excellent source of feedback, identifying where redundancies have occurred across courses and when a technology strategy has worked well in one course and could be preferably applied in another. Occupational Therapy faculty spent over half a year—including weekend retreats and
workshops—developing a philosophy, basic principles, and a framework of integrated themes as the prelude to redesigning individual courses for their curriculum.

**Linking Assessment Strategies to Learning Outcomes**

The ADDIE instructional design process begins with an analysis and identification of intended learning outcomes, stated in measurable terms, that learners must be able to demonstrate by completion of the unit of instruction: a lab, module, course, or even the entire curriculum. In essence, this implies that faculty and instructional designers begin to plan learning assessment and link it directly to learning outcomes at the outset of the course development process. In addition, the Center has employed the Quality Matters™ quality assurance process for evaluating blended learning courses. The Quality Matters process employs a rubric to identify if the type of assessments selected for a course measure the stated learning objectives and are consistent with course activities and resources. Assessment strategies must be aligned to measure effective learning, evaluate student progress by referring to stated learning outcomes, and be integrated within the learning process. A blended or online course, once completed, should be left online and open for review and reference for students through the rest of their program, pending faculty approval. Ongoing course access allows students to ‘spiral back’ to earlier-learned concepts, an important facet for integrating and reinforcing new knowledge and skills.

**Social Networking Media Offers Benefits for Student-Student and Student-Instructor Communications**

In CAHP programs, communication through the Web and social media is essential for building learning communities. A student-to-student “CLS Cafe” and “OT Cafe” were created as private discussion rooms within the Moodle content management system. These private discussion forums have enabled students to create learning and social communications across campuses and across cohorts in the specific programs. Ensured early in their programs that faculty cannot access these virtual spaces, students have confidently used the cafes for learning support; social event planning; advise about daycare, apartment, and other real-life needs; and also a place to safely complain to other students and receive reassurance about the challenges of their academic programs. Used effectively, social networking media are also excellent and efficient tools for streamlining essential academic and administrative communication about academic program requirements. Online orientation ‘courses’ and graduation preparation modules have been successful tools for consistent and reliable conveyance of key information to students at the time they require that information.

Center faculty have also increased efficiency and effectiveness of faculty-student communications and interaction using social networking media. For example, questions can be answered using discussion boards, allowing the faculty to answer a frequently-asked question only once while still providing the answer to students across campuses. Through trial and feedback, we have learned that the Web can serve as an efficient channel for submitting and returning assignments (such as Assignment Boxes in course management systems) and that email is an easy and secure tool for student questions and interactions with instructors. Faculty have noted that the one-on-one Web-based interactions they have experienced with students have enabled the establishment of faculty-student relationships that may be, in some ways, more rewarding even than those typically established within the traditional classroom-based cohorts:

“When I’m an instructor in the traditional classroom, I have a relationship with a group… But I think I know each individual student better now because of the online format, and I like that. I have a better handle on what each one knows about the subject matter.” (OT Faculty Member, January 2010 interview)

**Enhancing Student Engagement through Blended Learning**

Through blended learning, students can learn to work in small, virtual groups, contributing to staged questions in discussion boards and summarizing their own group’s work as they take turns in the role of ‘spokesperson.’ The Center’s design of online learning requires that students be responsible for their own learning, rather than passively listening to lectures as their main source of education. Now, students come to the less frequent face-to-face sessions having completed readings, prepared to interact with others, capable of reflecting on faculty questions, and with a readiness to apply basic concepts. For example, in Clinical Laboratory Science, students complete pre-lab simulations and exercises online, and come to the laboratory better prepared with clear expectations for their participation in laboratory experiences. In addition, pre-laboratory online videos allow each student a close view of the laboratory demonstration and can be viewed multiple times and in more detail than is possible in face-to-face laboratory demonstrations. In program evaluations and focus groups, occupational therapy students have now voiced higher expectations for face-to-face encounters that suggest they expect that class time be highly interactive and useful; otherwise, they have expressed their preference to learn on their own time, online.

Blended learning, as implemented in the Center, requires that learners actively engage with the content in self-directed ways. As an advanced organizer to help students plan their work load, weekly 'work plans' that contain the list of all the week’s assignments and requirements—with associated due dates—are provided to 'pop up and print out' so that students can manage all components of the blended learning experience [Figure 1]. They can select the sequence in which they complete their readings, online activities, and face-to-
face preparation, within the clearly stated deadline expectations.

The Role of Students in Quality Improvement

Asking for and receiving valuable feedback by providing easily accessible, anonymous, online sites encourages students to share honest ideas for quality improvement. Both programs in clinical laboratory sciences and occupational therapy provide online mechanisms to capture student feedback. Some faculty integrate an easily-accessible feedback template at the end of each week’s online module. It is important to differentiate between issues with technology in the delivery of the course from instructional methods such as whether the learning objectives align with learning activities and methods for assessing attainment of the objectives. To keep students engaged in the quality improvement process, they must receive explicit information regarding how faculty have addressed their feedback. Therefore, each course lists changes made to that course based upon prior student feedback, providing evidence to students that their ongoing input is valued.

Faculty Strategies for Building Teaching Efficiencies in the Blended Environment

The development of quality hybrid learning requires significant upfront development and design, as well as faculty commitment to that process. However, over time, Center faculty have learned to create their own strategies to most efficiently manage blended teaching and learning. For example, from student feedback and from individual experience, faculty have determined that online discussions should be limited to no more than one per week per class. Feedback for discussions and assignments can be effectively provided as one announcement to all students following an assignment due date, so that students can compare their own response with that of the faculty member. This strategy saves time for the faculty member and provides consistency of learning not possible with classroom-only instruction. Faculty have also become adept at integrating game-like practices and using course management system assessment tools as ways to allow students to complete self-assessments and reviews, and ensure their learning of key concepts.

Summary

In these ways, we have been able to design education that meets the workforce and societal and economic development needs of the state of Minnesota and beyond. By leveraging the technology infrastructure of the University of Minnesota, the Center has been able to create competency-based education for flexible delivery as most appropriate: online, classroom, laboratories, simulated experiences, experiential education. Through partnership and support across the University, the Center has been able to create an innovative hybrid educational platform and has piloted the University’s academic technology systems needed to deliver learner-centered and customer-service oriented educational programs.
Next Steps

Over the past 4 years, best practices in teaching and learning have been derived from feedback from allied health faculty and students. Has it made a difference in long-term outcomes regarding the placement of graduates and integration within the Minnesota workforce? A longitudinal evaluation of the first two blended learning cohorts as compared to the traditional, classroom-based cohorts is currently being completed and will be reported.

In addition, a concerted effort continues to enhance the skills and commitment of faculty regarding their personal engagement in technology-enhanced teaching and learning. A “CAHP Faculty Cafe” is currently under construction, as is an online “New Faculty Orientation.” Workshops about the use of virtual classroom technologies and other technology-enhanced learning tools continue to be high priority offerings for faculty across the Center with the expectation that ‘best practices for allied health faculty teaching and learning’ is on the horizon.

REFERENCES